

Second Generation Bicycle Charging Station

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Overview

- The Client
- Recognizing The Need
- Problem Definition
- Goals
- Objectives
- Constraints
- Quality Function Development
- Project Timeframe

The Client

- Marilla Lamb
 - Member of 1st generation bike charger team
 - B.S. Environmental Engineering
 - Currently in ME graduate program at NAU

The Client

- 2011
 - Grant proposed to the NAU Green Fund
- 2012
 - Green Fund approves grant

Recognizing The Need

- Demonstrate the importance of renewable energy sources
- Provide students with a way to understand and compare the amount of energy required to power and charge electronic devices with the amount of energy produced by pedaling a bicycle

Problem Definition

- 2.1 Goal
- 2.2 Objectives
- 2.3 Constraints

2.1 - Goals

- **Goal Statement**
 - To design a bicycle powered charging station which will provide the ability to charge small electronics while teaching about power generation.

2.2 - Objectives

- **Improve usability**

- Design bicycle to be comfortable for a variety of users
- Bike should be simple to use and understand for all age ranges

- **Improve versatility**

- AC plug
- Variety of chargers

2.2 - Objectives

- **Improve portability**
 - **Design for ease of assembly and disassembly**
- **Improve efficiency**
 - **Add a set of gears to maintain higher RPMs and improve user comfort**
 - **Divert power generated effectively between display and output**

2.3 - Constraints

- **Charging station must be able to be moved easily around campus to be used in various buildings and at different events.**
- **Power generation information will be displayed both as numerical information and graphically.**
- **Charging station must be built within the budget of \$1,600 provided by Green Fund.**

2.3 - Constraints

- **Station must contain an interactive display showing information such as**
 - **power generated**
 - **power used**
 - **total power generated over the lifetime of the charging station**
 - **total number of users**
 - **carbon offset**

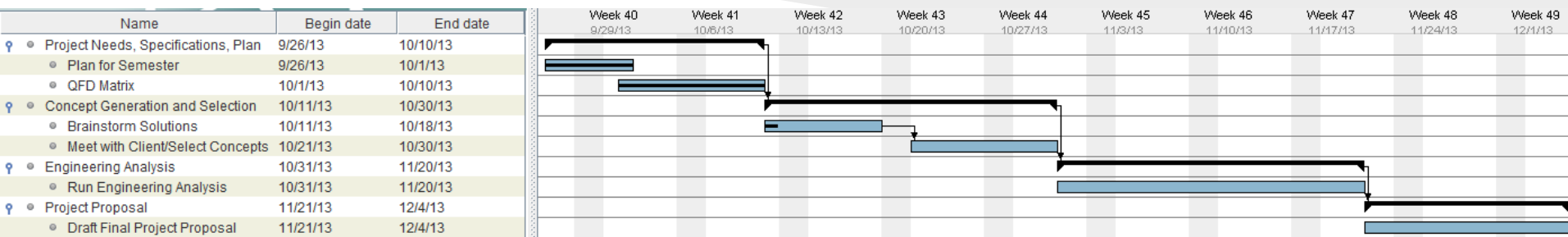
Quality Function Development

Objectives

		Specifications					
		Weighted Importance	Weight	Power Output	Cost	Required Maintenance	Accuracy
Adjustable	7	1		1	1	1	
Interactive display	10		3	3		3	
Sufficient AC Power	10	1	3	2		2	
Collapsible	4			2	2		
Geared	8	2		2	3		
Geomerty	3	3		3			
Multiple Chargers	8		2	1			
AC plug for Laptop Charging	10		3	1			
Shows Power Generated	10		1			2	
Shows Power Used	10		1			2	
Shows Total Power Generated	9		1			2	
Shows Total Number of Users	9		1			2	
Carbon Offset	8		3			2	
	Score		42	168	108	39	149
	Relative Weight		0.25	1.00	0.64	0.23	0.89
	Unit of Measure		lbs	Watt	\$	Hours	*

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Project Timeframe



Deliverables:

- Project Needs, Specifications, and Planning
- Concept Generation and Selection
- Engineering Analysis
- Final Project Proposal

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Summary

- Recognize the need to educate about power generation
- Defined our goal statement to educate and provide a bicycle generator that will produce higher wattage
- Incorporated constraints though Improving Usability, Versatility, Portability & Efficiency
- Based on QFD, Power Output is our teams most important specification
- Final project proposal to be submitted by first week of December 2013.

References

- "Bicycle Generator Project." Bicycle Generator Project. N.p., n.d. Web. 05 Oct. 2013. <<http://nau.edu/CEFNS/Centers-Institutes/Sustainable-Energy-Solutions/Education/Bicycle-Generator-Project/>>.
- Lamb, M., First Generation Bicycle Generator Design & Build Team. Personal Communication. 2013
- Lamb, M., The NAU Green Fund Addendum Application for Second Generation Charging Station. Feb. 2013.

Questions?